REMARKS

I. Introduction

In response to the Office Action dated December 28, 2005, Applicant has amended the specification to correct a minor typographical error. Claims 17, 24, 31 and 33-34 have been amended to further clarify the claimed subject matter. Support for these amendments can be found, for example, in Figs. 1-5, and their corresponding section(s) of the specification. Claim 35 is added. Support for the new claim can be found, for example, in Figs. 2-5, and their corresponding section(s) of the specification. Applicant submits that the present amendments do not raise any issue of new matter and are not presented to overcome the cited prior art.

For the reasons set forth below, Applicant respectfully submits that all pending claims are patentable over the cited references.

II. Claim Objections

Claims 20 and 24 are objected to under 37 C.F.R. § 1.75(c) as being of improper dependent form. Specifically, the Examiner asserts that the claimed feature "the group consisting of polymeric matrix with dispersed cyclodextrines and a polymeric matrix with anhydrides" associated with the **first active polymeric barrier layer** recited in claim 17 *excludes* cyclic olefin copolymer, and therefore claim 20, which is dependent upon claim 17, is improper, because claim 20 requires cyclic olefin copolymer.

Applicant respectfully disagrees. Applicant notes that in claims 20 and 24, it is the **second flexible multilayer packaging material** that includes the cyclic olefin copolymer. Claims 20 and 24 do not further limit the **first active polymeric barrier layer**.

Accordingly, for at least this reason, Applicant respectfully requests that the pending objections be withdrawn.

III. The Rejection Of Claims 17-26 and 28-33 Under 35 U.S.C. § 103

Claims 17-26 and 28-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over USP No. 6,624,568 to Silvernail in view of US Pub No. 2003/0113525 to Beaverson or USP No.

5,312,689 to Dasher. Applicant respectfully traverses this rejection for at least the following reasons.

Claim 17

Claim 17 recites an organic electronic device comprising a first flexible multilayer packaging material having a first active polymeric barrier layer that binds moisture and oxidizing agents and a ceramic barrier layer, wherein the first active polymeric barrier layer includes a **polymeric matrix with anhydrides**.

Silvernail describes an organic optoelectronic device (OLED) structure with a first barrier region 120 and a second barrier region 150 that block the transport of oxygen and water from the exterior environment to the OLED 140 (see, Fig. 1 and col. 4, lines 35-38). The first barrier region 120 includes barrier layers, including a planarizing material 121*a-c* and high-density material 122*a-c*, formed on a substrate 110 (col. 4, lines 51-55), and the second barrier region 150 includes a moisture- and oxygen-absorbing layer 155, planarizing material 151*a-d* and high-density material 152*a-b* (col. 5, lines 26-35). The moisture- and oxygen-absorbing layer 155 is a reactive metal (col. 5, lines 37-38) that can be used to absorb moisture and oxygen, while the planarizing material 121*a-c*, 151*a-d* is formed of a fluorinated polymer, parylene, cyclotene, polyester or polyacrylate (col. 4 line 64-col. 5, line 3), and the high-density material 122*a*-c, 152*a-b* is formed from a metal oxide, metal nitride, metal carbide or metal oxynitride (col. 5, lines 8-13) that can be used to hinder the diffusion of water and oxygen.

A. The Proposed Combination of Silvernail, Beaverson and Dasher Does Not Arrive At The Claimed Invention

In the pending rejection, the Examiner admits that the planarizing material 121*a-c* of Silvernail does not include a polymer matrix with dispersed cyclodextrines, and relies upon Beaverson to cure this deficiency. As a preliminary matter, this claimed feature has been deleted from claim 1, rendering the rejection using Beaverson moot.

With respect to Dasher, the Examiner asserts that Dasher discloses polymeric matrix with anhydrides.

Referring to Dasher, this reference describes ophthalmic lens with a barrier layer (e.g., barrier layer 22) that is impermeable to migrating components (col. 3, lines 20-24), which include water and anhydride, in order to be effective. The barrier layer is disposed between an epoxy layer and an urethane layer in order to solve the "migration problem" during the curing of the epoxy layer (col. 2, line 61 to page 3, line 32).

Further, Dasher suggests using commercially available polyolefin copolymers and terpolymers (col. 3, lines 61-63) modified with **acid or anhydride functional group(s)** (col. 3, lines 29-32), because barrier layers are "inherently difficult to bond to polyolefin" (col. 3, lines 40-41) and the acid or anhydride functionality in the modified polymer improves such adhesion characteristic (col. 3, lines 48-50).

i. The Barrier Layer of Dasher Does Not Bind Moisture And Oxidizing Agents

However, Applicant respectfully submits that the barrier layer of Dasher does not bind moisture and oxidizing agents.

To assist the Examiner in understanding of the barrier layer of Dasher, Applicant has enclosed herewith Exhibit A entitled "How Plexar® Tie-Layer Resins Function" retrieved from (http://www.equistarchem.com/html/polymer/performance_polymers/plexar_function.htm).

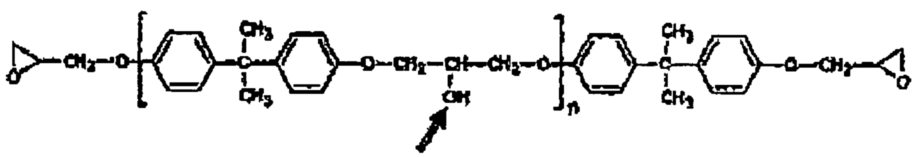
As discussed in Exhibit A, adhesion characteristic is improved if covalent bonds are formed. Covalent bonds typically provide excellent adhesion since they require significant energy to break. In the case of anhydride-modified polyolefins (AMP), covalent bonds are formed due to chemical reaction occurred between functional groups of the AMP-layer (e.g., anhydrides) and functional groups of an adjacent layer (e.g., substrate), and that anhydrides react with functional groups such as hydroxyls (-OH) and amines (-NH-).

Referring to Dasher, the barrier layer of Dasher, which is an AMP layer, is formed between an epoxy and an urethane layer. Urethanes typically have a chemical structure as follows:

$$R^1-NH-\underset{\underset{\displaystyle O}{\|}}{C}-O-R^2$$

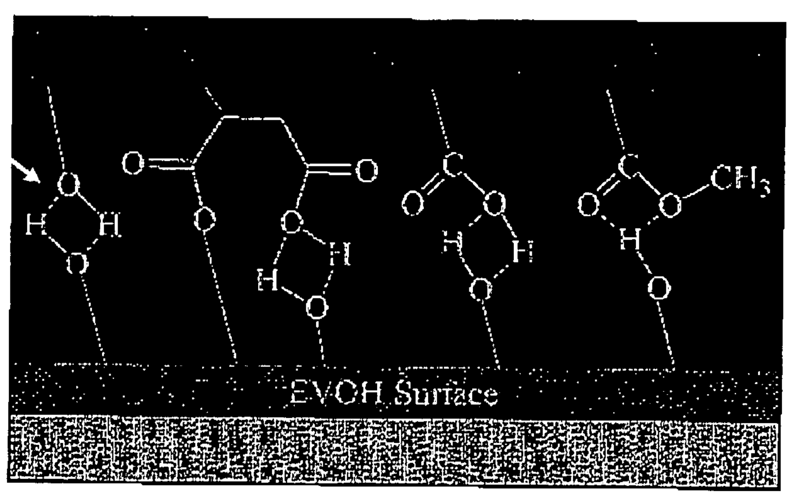
Due to the amine group (-NH-) in urethanes, urethanes can undergo the formation of covalent bonds with an anhydride (e.g., maleic anhydride).

Further, a typical epoxy (e.g., made from epichlorohydrin and bisphenol-A) has the following chemical structure:



Due to the hydroxyl (-OH-) group (marked by arrow) in epoxy, epoxy also can undergo formation of covalent bonds with anhydrides (note that this applies to any epoxy with functional hydroxyl or amine groups, and is not limited to those shown).

Furthermore, as shown in the drawing "Tie-Resin Grafted Backbone" of Exhibit A, an example of bonds between a substrate (EVOH surface) and a chemically-modified polyethylene layer is shown:



As indicated by the arrow above, a covalent bond is formed between a (former) functional maleic anhydride group and a functional hydroxyl (-OH) group of the substrate. Due to the formation of the covalent bond, the functional maleic anhydride group undergoes a ring

opening to yield the structure shown in Fig. 2. The OH-group of the substrate, which has already reacted with the anhydride via the ring opening, renders the former functional maleic anhydride group unable to take up moisture or oxygen. Due to this new structure, the former functional maleic anhydride group of the chemically-modified polyethylene layer can no longer bind moisture or oxygen.

In sum, the adhesion characteristic of the modified polymer material with respect to the barrier layer disclosed in Dasher is improved by reactions between the anhydride functional groups of the modified polymer material and the reactive moieties of molecules of the neighboring layers sandwiching the modified polymer material (e.g., urethane or epoxy layers). Due to such reactions, new chemical bonds are formed between the anhydride groups of the polyolefin polymeric materials and the reactive moieties of the urethane or epoxy groups. As a result, the chemical nature and functionality of the anhydride groups of the barrier layer of Dasher also are changed, rendering the anhydride groups unable to bind moisture and oxidizing agents.

For all of the foregoing reasons, Applicant respectfully submits that Dasher does not teach a barrier layer with anhydrides capable of binding moisture and oxidizing agents, and nothing suggests otherwise.

B. The Motivation To Combine Silvernail and Dasher

Even assuming *arguendo* that the pending rejection is proper, Applicant respectfully submits that a *prima facie* case of obviousness has not been established. As a reminder, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. The teaching or suggestion to make the claimed combination must be found in the prior art. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In the instant case, Applicant respectfully submits that the pending rejection has provided **no motivation** (let alone a sufficient motivation) to combine Silvernail and Dasher, and rather has merely provided a citation of Dasher that does not support a conclusion of motivation.

In fact, Applicant respectfully submits that the alleged motivation to improve the moisture barrier and adhesion properties of a polymer matrix is <u>not</u> applicable to the OLED of Silvernail, because Silvernail has already provided the means by which to improve moisture reduction (e.g., by utilizing a moisture- and oxygen- absorbing layer 155) and layer adhesiveness (e.g., the polymer substrate layer 110 to which the first barrier region 120 is attached utilizes a material capable of providing a strong adhesive bond with other materials (col. 4, lines 56-59)).

Indeed, it appears the pending rejection has impermissibly used hindsight in an attempt to reconstruct Applicant's invention by utilizing Applicant's specification inadvertently as a guide to pick and choose the selected elements from various references so as to reach the claimed invention. Hindsight reconstruction, using applicant's claims as a template to reconstruct the invention by ***picking and choosing*** isolated disclosures from the prior art, is impermissible. For example, in *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992), the Federal Circuit stated:

> It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. (citations and quotations omitted)

Applicant respectfully submits that the pending rejection has not provided any motivation to modify Silvernail other than to rely on the level of skill in the art, which is impermissible. *See Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

In this regard, Applicant would, again, stress that ***the mere identification of claim features in disparate references does not establish the requisite realistic motivation*** to support the ultimate legal conclusion of obviousness under 35 U.S.C. §103. *Grain Processing Corp. v. American-Maize Products Co.*, 840 F.2d 902, 5 USPQ2d 1788 (Fed. Cir. 1988).

Moreover, while Silvernail is directed to OLEDs, Dasher is directed to ophthalmic lenses. Dasher describes art that is non-analogous to OLEDs. One of ordinary skill in the art of OLEDs would not look to the field of ophthalmic lenses to form an OLED device. Thus, a person of

ordinary skill in the art would not combine the teachings from different fields, that is, of OLEDs and ophthalmic lenses.

Additionally, Dasher includes the acid or anhydride functional groups to improve adhesion, not to form a polymeric barrier layer that binds moisture and oxidizing agents. Thus, Dasher is not suggesting a solution to a problem with which the inventor is concerned.

For all of the foregoing reasons, the proposed combination fails to establish *prima facie* obviousness of the pending claims.

Claim 31

Claim 31 recites an organic electronic device. The device includes a first flexible multilayer packaging material having a first active polymeric barrier layer that binds moisture and oxidizing agents via chemi- or physisorption and a ceramic barrier layer.

However, as discussed *supra*, the barrier layer disclosed in Dasher does not bind moisture and oxidizing agents. Thus, for analogous reasons discussed with respect to claim 17, Applicant respectfully submits that claim 31 is allowable over the proposed combination of Silvernail and Dasher.

Furthermore, claim 31 recites in-part a flexible substrate having a first surface and a second surface, where the first surface is closer to the functional area than the second surface and **the second surface comprises a ceramic barrier**.

As a preliminary matter, it does not appear that the pending rejection has addressed the foregoing claimed feature. Having failed to specifically identify wherein an applied reference discloses each feature of a claimed invention, as claimed, the pending Office Action has, in effect, denied Applicant's procedural due process of law, in that it is difficult for the Applicant to respond to the rejection by shooting arrows into the dark. *In re Mullin, 481 F.2d 1333, 179 USPQ 97 (CCPA 1973).*

Even assuming *arguendo* that the foregoing claimed feature has been addressed in the pending Office Action, Applicant notes that while a first barrier region 120 is formed on the top surface of the substrate 110 of Silvernail, the bottom surface of the substrate 110 is essentially free of any material (let alone contains a ceramic barrier). Evidently, it is clear that the bottom surface of the substrate 110 does not include a ceramic barrier.

Accordingly, for at least the foregoing reasons, Applicant respectfully submits that claim 31 is patentable over the proposed combination of Silvernail, Beaverson and Dasher.

Claim 33

Claim 33 recites an organic electronic device. The device includes a first flexible multilayer packaging material that binds moisture and oxidizing agents via chemi- or physisorption and a ceramic barrier layer.

However, as discussed *supra*, the barrier layer disclosed in Dasher does not bind moisture and oxidizing agents. Thus, for analogous reasons discussed with respect to claim 17, Applicant respectfully submits that claim 33 is allowable over the proposed combination of Silvernail and Dasher.

Furthermore, claim 33 recites in-part a flexible substrate having an assembly of at least one active polymeric barrier layer and at least two adjacent first and second ceramic barrier layers **in direct contact with each other**, the first and second ceramic barrier layers exhibiting different microstructures.

However, the alleged ceramic layers or high density materials 122*a-c* of Silvernail clearly are not in contact with each other. Beaverson and Dasher do not disclose more than one ceramic layer, and therefore also do not cure this defect of Silvernail.

Accordingly, Applicant respectfully submits that claim 33 is patentable over the proposed combination of Silvernail, Beaverson and Dasher.

Thus, as each and every limitation must be either disclosed or suggested by the cited prior art in order to establish a *prima facie* case of obviousness (see, **M.P.E.P. § 2143.03**), and the proposed combination of Silvernail, Beaverson and Dasher fails to do so, it is respectfully submitted that the proposed combination fails to establish *prima facie* obviousness of the pending claims.

With respect to new claim 35, Applicant respectfully submits that none of the cited references disclose or suggest a first and second ceramic barrier layers having the same composition but exhibiting different microstructures. Accordingly, Applicant respectfully submits that claim 35 is also allowable over the cited references.

IV. All Dependent Claims Are Allowable Because The Independent Claims From Which They Depend Are Allowable

Under Federal Circuit guidelines, a dependent claim is neither anticipated nor rendered obvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co., 819 F.2d at 1100, 1108 (Fed. Cir. 1987)*. Accordingly, as independent claims 17, 31 and 33 are patentable for the reasons set forth above, it is respectfully submitted that all claims dependent thereon are also in condition for allowance.

V. Conclusion

By responding in the foregoing remarks only to particular positions taken by the Examiner, the Applicant does not acquiesce with other positions that have not been explicitly addressed. In addition, Applicant's arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist.

For all of the reasons set forth above, it is urged that the application is in condition for allowance, an indication of which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicant's attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 06-1050 and please credit any excess fees to such deposit account.

Respectfully submitted,

Date: June 28, 2006

Alex H. Chan
Reg. No. 52,713

Customer No. 26181
Fish & Richardson P.C.
Telephone: (650) 839-5070
Facsimile: (650) 839-5071

50321324.doc

EQUISTAR
A Lyondell Company

search
site map
links
contact

HOME
- About Equistar
- News Center
- Chemicals
- Polymers
- Technology / R&D
- Equistar Pipeline
- e-Business
- Lyondell

Polymer Products

Advanced Product Search

-- Select Product by Type --

-- Select Product by Application --

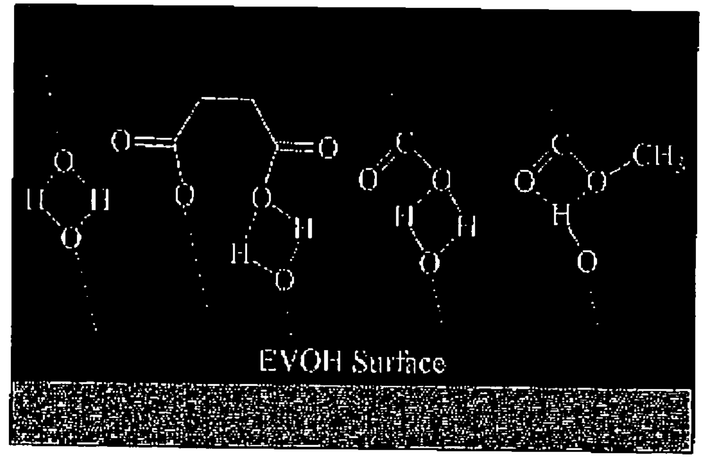
How Plexar® Tie-layer Resins Function

Understanding various adhesion mechanisms is important to understanding why good adhesion is achieved with certain materials but not with others. Adhesion between two polymer substrates can occur by a variety of mechanisms. In decreasing order of typical adhesion strength, the various adhesion mechanisms are:

- Chain entanglement
- Covalent bonding
- Hydrogen bonding
- Dipole-dipole non-hydrogen bonding
- Van der Waals forces

Covalent bonds are formed by the reaction of two chemical groups and typically result in the highest adhesion. Covalent bonds typically provide excellent adhesion since they require significant energy to break. In anhydride-modified polyolefins (AMP), covalent bonds can result from the reaction that occurs between the functional group in the tie-layer and the bonding substrate. Anhydrides will react with groups that contain labile hydrogen, such as hydroxyls (OH) and amines (NH 2), but otherwise do not typically form a covalent bond. For example, the anhydride group in the AMP will react with the hydroxyl group in the EVOH to form an ester linkage, but AMP will not react with the side-chain aromatic group on polystyrene.

EXHIBIT A



Besides covalent bonding, the other kinds of chemical bonding are dipole-dipole interactions and Van der Waals forces. Dipole-dipole interactions occur when the positive end of one polar molecule is attracted to the negative end of another polar group. Conversely, two identical atoms bonded together are non-polar as with polyethylene. The C-H bond has very limited polarity which does not result in dipolar bonding. An especially strong kind of dipole-dipole attraction is hydrogen bonding. The positively charged hydrogen is attracted to, but does not react with, a negatively charged functional group. To have a sufficient positive charge for hydrogen bonding, the hydrogen atom must be connected to an electronegative atom such as nitrogen or oxygen. Acids (COOH), amines (NH 2), amides (NHCO) and hydroxyls (OH) groups can therefore have hydrogen bonding, while a methyl group is essentially non-polar and is not capable of hydrogen bonding. The strength of the hydroxyl hydrogen bond (H...O-H) is about one tenth that of the hydroxyl (O-H) covalent bond. An even weaker interaction, but still important factor, is Van der Waals forces. These forces result from the small dipoles that exist in all molecules and require that the polymer chains be in very close proximity to have an effect.

While chemical interactions are important for bonding, resins such as low-density polyethylene (LDPE) and EVA typically have excellent adhesion to each other although no covalent bonding or dipole-dipole interaction occurs. These materials adhere well due to chain entanglement whereby polymer chains diffuse into the other material and become entangled. If the materials are semi-crystalline, co-crystallization can occur which further improves adhesion compared to chain entanglement in the amorphous state. In order for chain entanglement to occur, the materials must be in the melt state, be compatible and have sufficient contact time. The ability of the materials to diffuse is related to the wetability of the materials. If the resins have similar surface energies and are compatible, the resins are considered to have good wetability. The table below shows examples of polymer substrates and the adhesion mechanisms that are present.

Substrate 1	Substrate 2	Typical adhesion	Covalent bonding	Hydrogen bonding	Dipole-dipole non-hydrogen bonding	Van der Waals	Chain entanglement

BEST AVAILABLE COPY

EXHIBIT A

EVOH	Plexar	Excellent	•	•	•	•	
EVOH	Nylon	Good		•	•	•	
EVOH	HDPE	Poor				•	
Nylon	Plexar	Excellent	•	•	•	•	
Nylon	EVA	Fair			•	•	
Nylon	Ionomer	Fair			•	•	
Nylon	Acid Copolymer	Good		•	•	•	
Ionomer	EVA	Fair			•	•	
PS	EVA	Fair			•	•	
EVA	PET	Fair			•	•	
Aluminum	Plexar	Excellent	•	•	•	•	
EVA	LDPE	Excellent				•	•

See also: Factors Affecting Adhesion in Coextrusion

For comments send email or call 800-615-8899.

Top of page

General Information and Privacy Statement